

CHAPTER 3

HEART AND LUNG TRANSPLANTATION

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3.0 INTRODUCTION

The first heart transplant in Malaysia was in 1997, and the first lung transplant in Malaysia was in 2005. Since then the numbers of thoracic transplant has remained few and far in between. For end stage heart failure patients, the use of ventricular assist device as a bridge to heart transplant has been employed, to keep the patients alive when their condition deteriorated on the heart transplant waiting list.

In 2011, there were 3 heart transplants, 3 heart lung transplants and 1 double lung transplant.

After almost 14 years since heart transplant started in Malaysia, the Kaplan Meier survival curve show a 51% survival up to 5 years.

The rest of the report that follows will review the results of heart and lung transplantation in Malaysia till end of 2011.

HEART TRANSPLANTATION

3.1 STOCK AND FLOW

Table 3.1.1a: Stock and Flow of Heart Transplantation, 1997-2011

| Year | 97 | 98 | 99 | 2000 | 01 | 02 | 03 | 04 | 05 | 06 | 07 | 08 | 09 | 10 | 11 |
|------------------------------------|----|----|----|------|----|----|----|----|----|----|----|----|----|----|----|
| New transplant patients | 1 | 3 | 2 | 3 | 4 | 0 | 2 | 0 | 1 | 1 | 1 | 0 | 1 | 0 | 3 |
| Deaths | 0 | 1 | 0 | 3 | 1 | 3 | 1 | 0 | 0 | 1 | 0 | 0 | 1 | 0 | 0 |
| Retransplanted | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 |
| Lost to follow up | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Alive at 31 st December | 1 | 3 | 5 | 5 | 8 | 5 | 6 | 6 | 7 | 7 | 8 | 8 | 8 | 8 | 11 |

Note: The same patient was re-transplanted in the year 2007, thus only counted as one

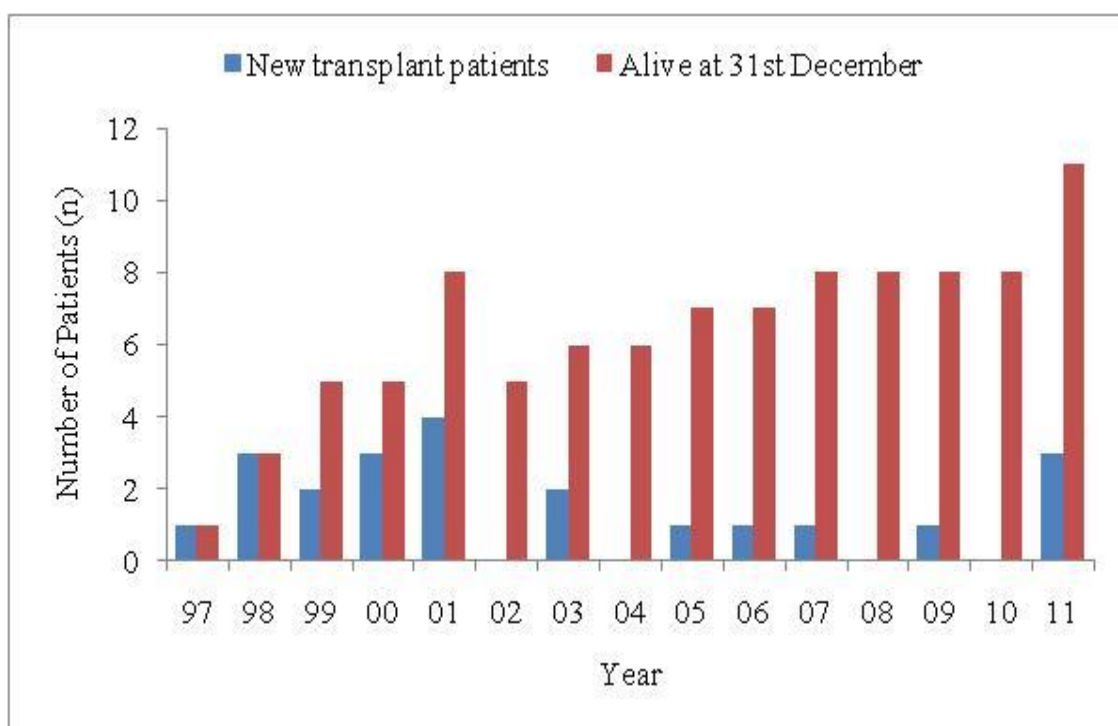


Figure 3.1.1a: Stock and Flow of Heart Transplant, 1997-2011

3.2 RECIPIENTS' CHARACTERISTICS

Table 3.2.1a: Distribution of Patients by Gender, 1997-2011

| Year | 97 | 98 | 99 | 2000 | 01 | 02 | 03 | 04 | 05 | 06 | 07 | 08 | 09 | 10 | 11 | TOTAL |
|--------------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|-----------|
| Gender | No. | No. | No. | No. | No. | No. | No. | No. | No. | No. | No. | No. | No. | No. | No. | No. |
| Male | 1 | 3 | 0 | 2 | 2 | 0 | 2 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 3 | 15 |
| Female | 0 | 0 | 2 | 1 | 2 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 0 | 0 | 7 |
| TOTAL | 1 | 3 | 2 | 3 | 4 | 0 | 2 | 0 | 1 | 1 | 1 | 0 | 1 | 0 | 3 | 22 |

Note: The same patient was re-transplanted in the year 2007, thus only counted as one

Table 3.2.2a: Distribution of Patients by Ethnic Group, 1997-2011

| Year | 97 | 98 | 99 | 2000 | 01 | 02 | 03 | 04 | 05 | 06 | 07 | 08 | 09 | 10 | 11 | TOTAL |
|--------------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|-----------|
| Ethnic group | No. | No. | No. | No. | No. | No. | No. | No. | No. | No. | No. | No. | No. | No. | No. | No. |
| Malay | 0 | 0 | 1 | 1 | 2 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 2 | 7 |
| Chinese | 0 | 0 | 0 | 1 | 0 | 0 | 1 | 0 | 0 | 0 | 1 | 0 | 1 | 0 | 1 | 5 |
| Indian | 1 | 3 | 1 | 1 | 2 | 0 | 1 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 10 |
| TOTAL | 1 | 3 | 2 | 3 | 4 | 0 | 2 | 0 | 1 | 1 | 1 | 0 | 1 | 0 | 3 | 22 |

Note: The same patient was re-transplanted in the year 2007, thus only counted as one

Table 3.2.3a: Distribution of Patients by Age, 1997-2011

| Year | 97 | 98 | 99 | 2000 | 01 | 02 | 03 | 04 | 05 | 06 | 07 | 08 | 09 | 10 | 11 | TOTAL |
|--------------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|-----------|
| Age, years | No. | No. | No. | No. | No. | No. | No. | No. | No. | No. | No. | No. | No. | No. | No. | No. |
| 0-19 | 0 | 0 | 2 | 1 | 1 | 0 | 0 | 0 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 6 |
| 20-39 | 0 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 4 |
| 40-59 | 1 | 1 | 0 | 2 | 3 | 0 | 2 | 0 | 0 | 1 | 0 | 0 | 1 | 0 | 1 | 12 |
| ≥60 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| TOTAL | 1 | 3 | 2 | 3 | 4 | 0 | 2 | 0 | 1 | 1 | 1 | 0 | 1 | 0 | 3 | 22 |
| Mean | 51 | 40 | 15 | 37 | 38 | - | 46 | - | 15 | 44 | 14 | - | 41 | - | 36 | 35 |
| SD | - | 9 | 1 | 22 | 17 | - | 8 | - | - | - | - | - | - | - | 13 | 15 |
| Median | 51 | 37 | 15 | 44 | 43 | - | 46 | - | 15 | 44 | 14 | - | 41 | - | 33 | 40 |
| Minimum | 51 | 33 | 15 | 13 | 14 | - | 40 | - | 15 | 44 | 14 | - | 41 | - | 25 | 13 |
| Maximum | 51 | 50 | 16 | 55 | 54 | - | 52 | - | 15 | 44 | 14 | - | 41 | - | 50 | 54 |

Age=date of transplant-date of birth

Note: The same patient was re-transplanted in the year 2007, thus only counted as one

Age for 2007 patient was same for 1st and 2nd transplant

Table 3.2.4a: Distribution of Patients by Primary Diagnosis, 1997-2011

| Year | 97 | 98 | 99 | 2000 | 01 | 02 | 03 | 04 | 05 | 06 | 07 | 08 | 09 | 10 | 11 | TOTAL |
|-----------------------------------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|-----------|
| Primary diagnosis | No. | No. | No. | No. | No. | No. | No. | No. | No. | No. | No. | No. | No. | No. | No. | No. |
| Ischaemic Cardiomyopathy | 1 | 3 | 0 | 1 | 1 | 0 | 2 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 9 |
| Idiopathic Dilated Cardiomyopathy | 0 | 0 | 2 | 1 | 2 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 1 | 7 |
| Restrictive Cardiomyopathy | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| End Stage Valvular Heart Disease | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 2 |
| Hypertrophic Cardiomyopathy | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 |
| Others | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 0 | 1 | 3 |
| TOTAL | 1 | 3 | 2 | 3 | 4 | 0 | 2 | 0 | 1 | 1 | 1 | 0 | 1 | 0 | 3 | 22 |

Note: The same patient was re-transplanted in the year 2007, thus only counted as one

3.3 TRANSPLANT PRACTICES

Table 3.3.1a: Distribution of Patients by Heart Procedure, 1997-2011.

| Year | 97 | 98 | 99 | 00 | 01 | 02 | 03 | 04 | 05 | 06 | 07 | 08 | 09 | 10 | 11 | TOTAL |
|------------------------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|-----------|
| Heart Procedure | No. | No. | No. | No. | No. | No. | No. | No. | No. | No. | No. | No. | No. | No. | No. | No. |
| Orthotopic Bicaval | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 4 |
| Orthotopic Traditional | 0 | 2 | 2 | 3 | 4 | 0 | 2 | 0 | 1 | 1 | 1 | 0 | 1 | 0 | 1 | 18 |
| Heterotopic | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| TOTAL | 1 | 3 | 2 | 3 | 4 | 0 | 2 | 0 | 1 | 1 | 1 | 0 | 1 | 0 | 3 | 22 |

Table 3.3.2a: Distribution of Patients by Immunosuppressive Used, 1997-2011

| Year | 97 | 98 | 99 | 00 | 01 | 02 | 03 | 04 | 05 | 06 | 07 | 08 | 09 | 10 | 11 | Total |
|--|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|-----------|
| Type of immunosuppressive | No. | No. | No. | No. | No. | No. | No. | No. | No. | No. | No. | No. | No. | No. | No. | No. |
| Steroids | | | | | | | | | | | | | | | | |
| Prednisolone | 1 | 3 | 2 | 3 | 4 | 0 | 1 | 0 | 1 | 0 | 1 | 0 | 1 | 0 | 3 | 20 |
| Methylprednisolone | 1 | 3 | 2 | 3 | 4 | 0 | 2 | 0 | 1 | 1 | 2 | 0 | 1 | 0 | 3 | 23 |
| Calcineurin Inhibitors | | | | | | | | | | | | | | | | |
| Cyclosporin A | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Neoral® | 1 | 3 | 2 | 3 | 4 | 0 | 1 | 0 | 1 | 1 | 1 | 0 | 1 | 0 | 3 | 21 |
| Tacrolimus (FK506) | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 1 |
| Antimetabolites | | | | | | | | | | | | | | | | |
| Azathioprine (AZA) | 1 | 3 | 2 | 3 | 4 | 0 | 2 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 16 |
| Mycophenolate Mofetil (MMF) | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 1 | 0 | 2 | 0 | 1 | 0 | 3 | 8 |
| Anti-lymphocyte Receptor Antibodies | | | | | | | | | | | | | | | | |
| Anti-thymocyte globulin (ATG) | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 0 | 0 | 0 | 0 | 2 |
| Simulect | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 |
| TOTAL patients at notification | 1 | 3 | 2 | 3 | 4 | 0 | 2 | 0 | 1 | 1 | 1 | 0 | 1 | 0 | 3 | 22 |

Table 3.3.3a: Immunosuppressive Used at Time of Last Follow-up up to 2011

| Year of follow up* | 2004 | 2005 | 2006 | 2007 | 2008 | 2009 | 2010 | 2011 |
|------------------------------------|----------|----------|----------|----------|----------|----------|----------|----------|
| Type of immunosuppressive | No. | No. | No. | No. | No. | No. | No. | No. |
| Steroids | | | | | | | | |
| Prednisolone | 3 | 4 | 4 | 3 | 4 | 3 | 3 | 2 |
| Methylprednisolone | 1 | 1 | 0 | 0 | 2 | 2 | 1 | 0 |
| Everolimus | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 |
| Calcineurin Inhibitors | | | | | | | | |
| Cyclosporin A | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Neoral® | 6 | 6 | 7 | 7 | 7 | 7 | 7 | 6 |
| FK506 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 1 |
| Antimetabolites | | | | | | | | |
| Azathioprine (AZA) | 3 | 3 | 3 | 3 | 2 | 2 | 1 | 1 |
| Mycophenolate Mofetil (MMF) | 3 | 3 | 5 | 5 | 6 | 6 | 6 | 6 |
| TOTAL patients at follow-up | 6 | 6 | 7 | 7 | 8 | 8 | 8 | 8 |

*Data according to year of follow up of transplanted patients

Table 3.3.4a: Duration of Waiting Time on Waiting List, 1997-2011

| Year | 97 | 98 | 99 | 00 | 01 | 02 | 03 | 04 | 05 | 06 | 07 | 08 | 09 | 10 | 11 | TOTAL |
|--------------------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|-----------|
| Duration (months)* | No. | No. | No. | No. | No. | No. | No. | No. | No. | No. | No. | No. | No. | No. | No. | No. |
| <5 | 0 | 2 | 1 | 0 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 7 |
| 5≤10 | 1 | 0 | 1 | 0 | 1 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 4 |
| 10≤15 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 1 | 0 | 0 | 4 |
| 15≤20 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 |
| 20≤25 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 25≤30 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 30≤35 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 35≤40 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 |
| 40≤45 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 45≤50 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 50≤55 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 55≤60 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 60≤65 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 |
| TOTAL | 1 | 2 | 2 | 2 | 2 | 0 | 2 | 0 | 1 | 1 | 1 | 0 | 1 | 0 | 3 | 18 |
| Mean | 6 | 2 | 4 | 15 | 5 | - | 20 | - | 9 | 10 | 13 | - | 13 | - | 21 | 11 |
| SD | - | 0 | 1 | 6 | 5 | - | 25 | - | - | - | 0 | - | - | - | 34 | 7 |
| Median | 6 | 2 | 4 | 15 | 5 | - | 20 | - | 9 | 10 | 13 | - | 13 | - | 2 | 15 |
| Minimum | 6 | 2 | 3 | 10 | 1 | - | 2 | - | 9 | 10 | 13 | - | 13 | - | 1 | 1 |
| Maximum | 6 | 2 | 5 | 19 | 8 | - | 37 | - | 9 | 10 | 13 | - | 13 | - | 61 | 61 |

*Duration=date of transplant-date added to wait list

3.4 TRANPLANT OUTCOMES

Table 3.4.1: Post Transplant Events at Last Follow-up up to 2011

| Year of transplant* | 97 | 98 | 99 | 00 | 01 | 02 | 03 | 04 | 05 | 06 | 07 | 08 | 09 | 10 | 11 | TOTAL |
|------------------------------------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|
| Type of post transplant events | No. | No. | No. | No. | No. | No. | No. | No. | No. | No. | No. | No. | No. | No. | No. | No. |
| Drug Treated Hypertension | 0 | 1 | 1 | 0 | 2 | 0 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 6 |
| Bone Disease (Symptomatic) | 0 | 0 | 0 | 0 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 |
| Chronic Liver Disease | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Cataracts | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Diabetes | 0 | 1 | 0 | 0 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 3 |
| Renal Dysfunction | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 |
| Stroke | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Drug-Treated Hyperlipidaemia | 0 | 1 | 1 | 0 | 2 | 0 | 1 | 0 | 1 | 0 | 1 | 0 | 1 | 0 | 0 | 8 |
| TOTAL patients at follow-up | 0 | 1 | 1 | 0 | 2 | 0 | 1 | 0 | 1 | 0 | 1 | 0 | 1 | 0 | 0 | 8 |

*Data according to year of transplant of patient

Table 3.4.2: Post Transplant Malignancies at Follow-up up to 2011

| Year of transplant* | 97 | 98 | 99 | 00 | 01 | 02 | 03 | 04 | 05 | 06 | 07 | 08 | 09 | 10 | 11 | TOTAL |
|--------------------------------------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|
| Type of post transplant malignancies | No. | No. | No. | No. | No. | No. | No. | No. | No. | No. | No. | No. | No. | No. | No. | No. |
| Donor related | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Recurrence of pre-transplant tumor | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| De novo solid tumor | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| De novo lymphoproliferative | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 1 |
| Skin | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Total patients at follow up | 0 | 1 | 1 | 0 | 2 | 0 | 1 | 0 | 1 | 0 | 1 | 0 | 1 | 1 | 0 | 8 |

*Data according to year of transplant of patient

Table 3.4.3: Non-compliance at Follow-up up to 2011

| Year of transplant* | 97 | 98 | 99 | 00 | 01 | 02 | 03 | 04 | 05 | 06 | 07 | 08 | 09 | 10 | 11 | TOTAL |
|---|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|
| Non-compliance during follow-up | No. | No. | No. | No. | No. | No. | No. | No. | No. | No. | No. | No. | No. | No. | No. | No. |
| • Yes | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| • No | 0 | 1 | 1 | 0 | 2 | 0 | 1 | 0 | 1 | 0 | 1 | 0 | 1 | 0 | 0 | 8 |
| • Missing | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| TOTAL patients at follow-up | 0 | 1 | 1 | 0 | 2 | 0 | 1 | 0 | 1 | 0 | 1 | 0 | 1 | 0 | 0 | 8 |
| <i>Areas of non-compliance:</i> | | | | | | | | | | | | | | | | |
| • Immunosuppress-ion medication | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| • Patient unable to afford immunosuppress-ion medications | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| • Other medication | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| • Other therapeutic regimen | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| TOTAL patients with noncompliance | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |

*Data according to year of transplant of patient

Table 3.4.4: Patient Treated for Rejection at Follow-up up to 2011

| Year of transplant* | 97 | 98 | 99 | 00 | 01 | 02 | 03 | 04 | 05 | 06 | 07 | 08 | 09 | 10 | 11 | TOTAL |
|--------------------------------------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|
| Patient treated for rejection | No. | No. | No. | No. | No. | No. | No. | No. | No. | No. | No. | No. | No. | No. | No. | No. |
| • Yes | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 1 |
| • No | 0 | 1 | 1 | 0 | 2 | 0 | 1 | 0 | 1 | 0 | 0 | 0 | 1 | 0 | 0 | 7 |
| TOTAL patients at follow-up | 0 | 1 | 1 | 0 | 2 | 0 | 1 | 0 | 1 | 0 | 1 | 0 | 1 | 0 | 0 | 8 |
| <i>Number of rejection events</i> | | | | | | | | | | | | | | | | 0 |
| • 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 1 |
| • 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| TOTAL patients with rejection | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 1 |

*Data according to year of transplant of patient

Table 3.4.5a: Distribution of Patients by Time of Deaths, 1997-2011

| Year of discharge | 97 | 98 | 99 | 00 | 01 | 02 | 03 | 04 | 05 | 06 | 07 | 08 | 09 | 10 | 11 | TOTAL |
|--------------------------------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|-----------|
| Time of deaths* | No. | No. | No. | No. | No. | No. | No. | No. | No. | No. | No. | No. | No. | No. | No. | No. |
| <3 months (at discharge) | 0 | 1 | 0 | 2 | 0 | 1 | 1 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 6 |
| 3-<6 months | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 6 months-1 year | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 |
| >1 year | 0 | 0 | 0 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 4 |
| TOTAL patients who died | 0 | 1 | 0 | 3 | 1 | 3 | 1 | 0 | 0 | 1 | 0 | 0 | 1 | 0 | 0 | 11 |

*Time=Date of death–date of transplant

Table 3.4.6: Patient Survival, 1997-2011

| Year of Transplant | 1997-2011 | |
|--------------------|------------|------|
| Interval | % Survival | SE |
| 1 year | 57 | 0.10 |
| 3 year | 51 | 0.11 |
| 5 year | 51 | 0.11 |
| 10 year | 40 | 0.13 |

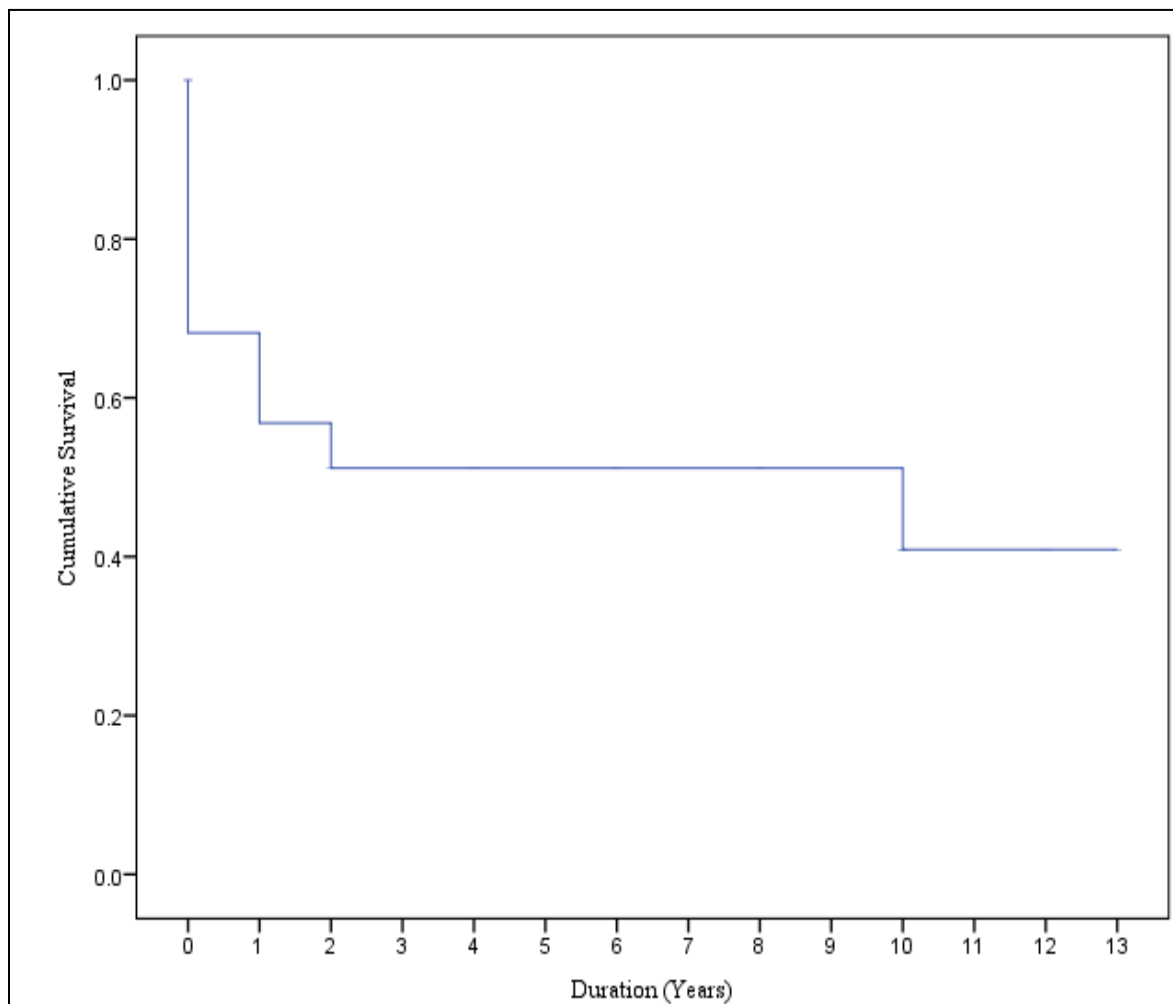


Figure 3.4.6: Patient Survival, 1997-2011

Table 3.4.7: Cause of Death at Discharge, 1997-2011

| Year | 97 | 98 | 99 | 00 | 01 | 02 | 03 | 04 | 05 | 06 | 07 | 08 | 09 | 10 | 11 | TOTAL |
|--|------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|--------------|
| Cause of death | No. | No. | No. | No. | No. | No. | No. | No. | No. | No. | No. | No. | No. | No. | No. | No. |
| Hyperacute rejection | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 |
| Multi organ failure | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 |
| Respiratory failure secondary to septicaemia | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 |
| Respiratory failure, renal function and liver failure, ARDS, septicaemia | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 |
| Septicaemia, multiorgan failure | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 |
| Graft failure | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 1 |
| TOTAL patients who died at discharge | 0 | 1 | 0 | 2 | 0 | 1 | 1 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 1 | 6 |

Table 3.4.8: Cause of Death at Follow-up, 1997-2011

| Year | 97 | 98 | 99 | 00 | 01 | 02 | 03 | 04 | 05 | 06 | 07 | 08 | 09 | 10 | 11 | TOTAL |
|---|------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|--------------|
| Cause of death | No. | No. | No. | No. | No. | No. | No. | No. | No. | No. | No. | No. | No. | No. | No. | No. |
| Severe Bleeding | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 |
| Lung cancer, small cell type bronchopneumonia | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 |
| Rejection due to non compliance | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 |
| Sudden death due most likely to graft CAD | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 1 |
| Unknown | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 |
| TOTAL patients who died at follow up | 0 | 0 | 0 | 1 | 1 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 5 |

LUNG TRANSPLANTATION

Table 3.1.1b: Stock and Flow of Lung Transplantation, 2005-2011

| Year | 2005 | 2006 | 2007 | 2008 | 2009 | 2010 | 2011 |
|--|------|------|------|------|------|------|------|
| New Heart and Lung Transplant Patients | 0 | 0 | 1 | 0 | 0 | 0 | 3 |
| New Lung Transplant Patients | 1 | 1 | 1 | 0 | 0 | 1 | 1 |
| Deaths | 0 | 1 | 1 | 0 | 0 | 2 | 1 |
| Retransplanted | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Lost to follow up | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Alive at 31 st December | 1 | 1 | 2 | 2 | 2 | 1 | 4 |

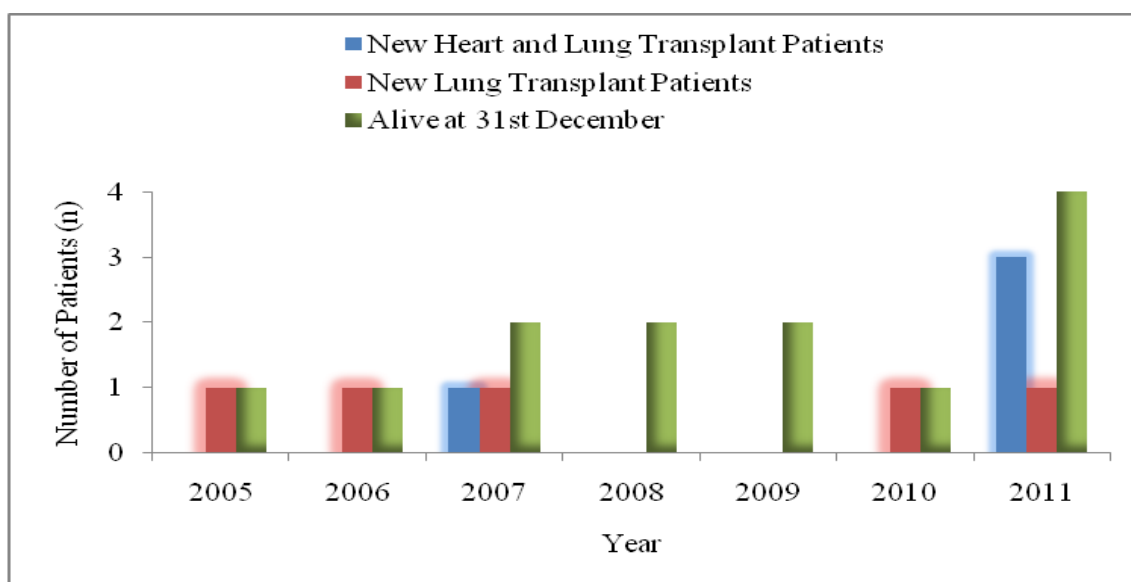


Figure 3.1.1b Stock and Flow of Lung Transplant and Heart Lung Transplant

3.2 RECIPIENTS' CHARACTERISTICS

Table 3.2.1b: Distribution of Patients by Gender, 2005-2011

| Year | 2005 | 2006 | 2007 | 2008 | 2009 | 2010 | 2011 | TOTAL |
|--------------|----------|----------|----------|----------|----------|----------|----------|----------|
| Gender | No. | No. | No. | No. | No. | No. | No. | No. |
| Male | 1 | 1 | 1 | 0 | 0 | 0 | 3 | 6 |
| Female | 0 | 0 | 1 | 0 | 0 | 1 | 1 | 3 |
| TOTAL | 1 | 1 | 2 | 0 | 0 | 1 | 4 | 9 |

Table 3.2.2b: Distribution of Patients by Ethnic Group, 2005-2011

| Year | 2005 | 2006 | 2007 | 2008 | 2009 | 2010 | 2011 | TOTAL |
|-------------------|----------|----------|----------|----------|----------|----------|----------|----------|
| Ethnic group | No. | No. | No. | No. | No. | No. | No. | No. |
| Malay | 0 | 0 | 1 | 0 | 0 | 0 | 2 | 3 |
| Chinese | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 |
| Indian | 1 | 1 | 0 | 0 | 0 | 1 | 1 | 4 |
| Bumiputra Sarawak | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 1 |
| TOTAL | 1 | 1 | 2 | 0 | 0 | 1 | 4 | 9 |

Table 3.2.3b: Distribution of Patients by Age, 2005-2011

| Year | 2005 | 2006 | 2007 | 2008 | 2009 | 2010 | 2011 | TOTAL |
|--------------|----------|----------|----------|----------|----------|----------|----------|----------|
| Age, years | No. | No. | No. | No. | No. | No. | No. | No. |
| 0-19 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 1 |
| 20-39 | 0 | 1 | 1 | 0 | 0 | 0 | 2 | 4 |
| 40-59 | 1 | 0 | 0 | 0 | 0 | 1 | 2 | 4 |
| ≥60 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| TOTAL | 1 | 1 | 2 | 0 | 0 | 1 | 4 | 9 |

Age=date of transplant-date of birth

Table 3.2.4b: Distribution of Patients by Primary Diagnosis, 2005-2011

| Year | 2005 | 2006 | 2007 | 2008 | 2009 | 2010 | 2011 | TOTAL |
|--|----------|----------|----------|----------|----------|----------|----------|----------|
| Primary diagnosis | No. | No. | No. | No. | No. | No. | No. | No. |
| Idiopathic pulmonary fibrosis | 1 | 1 | 1 | 0 | 0 | 1 | 1 | 5 |
| Idiopathic pulmonary arterial hypertension | 0 | 0 | 1 | 0 | 0 | 0 | 1 | 2 |
| Chronic obstructive pulmonary disease | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Bronchiectasis | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 |
| Others | 0 | 0 | 0 | 0 | 0 | 0 | 1* | 1 |
| TOTAL | 1 | 1 | 2 | 0 | 0 | 1 | 4 | 9 |

* ventricular septal defect (VSD) and eisenmenger's syndrome

3.3 TRANSPLANT PRACTICES

Table 3.3.1b: Distribution of Patients by Heart Procedure, 2005-2011

| Year | 2005 | 2006 | 2007 | 2008 | 2009 | 2010 | 2011 | TOTAL |
|------------------------|----------|----------|----------|----------|----------|----------|----------|----------|
| Heart Procedure | No. | No. | No. | No. | No. | No. | No. | No. |
| Single lung transplant | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 1 |
| Double lung transplant | 0 | 1 | 1 | 0 | 0 | 1 | 1 | 4 |
| Heart-Lung transplant | 0 | 0 | 1 | 0 | 0 | 0 | 3 | 4 |
| TOTAL | 1 | 1 | 2 | 0 | 0 | 1 | 4 | 9 |

Table 3.3.3b: Immunosuppressive Used at Time of Last Follow-up up to 2011

| Year of follow up* | 2005 | 2006 | 2007 | 2008 | 2009 | 2010 | 2011 |
|------------------------------------|----------|----------|----------|----------|----------|----------|----------|
| Type of immunosuppressive | No. | No. | No. | No. | No. | No. | No. |
| Steroids: | | | | | | | |
| Prednisolone | 1 | 2 | 2 | 1 | 0 | 0 | 0 |
| Methylprednisolone | 1 | 1 | 2 | 0 | 0 | 0 | 0 |
| Calcineurin Inhibitors: | | | | | | | |
| Neoral® | 1 | 2 | 3 | 0 | 0 | 0 | 0 |
| FK506 (Tacrolimus) | 0 | 0 | 0 | 2 | 2 | 1 | 0 |
| Cyclosporin A | 0 | 0 | 0 | 0 | 0 | 1 | 1 |
| Antimetabolites: | | | | | | | |
| Mycophenolate Mofetil (MMF) | 1 | 2 | 3 | 2 | 0 | 0 | 1 |
| TOTAL patients at follow-up | 1 | 2 | 3 | 2 | 2 | 1 | 1 |

*Data according to year of follow up of transplanted patients

3.4 TRANSPLANT OUTCOMES

Table 3.4.5b: Distribution of Patients by Time of Deaths, 2005-2011

| Year of discharge | 2005 | 2006 | 2007 | 2008 | 2009 | 2010 | 2011 | TOTAL |
|--------------------------------|----------|----------|----------|----------|----------|----------|----------|----------|
| Time of deaths* | No. | No. | No. | No. | No. | No. | No. | No. |
| <3 months (at discharge) | 0 | 1 | 1 | 0 | 0 | 1 | 1 | 4 |
| 3-<6 months | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 6 months-1 year | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| >1 year | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 1 |
| TOTAL patients who died | 0 | 1 | 1 | 0 | 0 | 2 | 1 | 5 |

*Time=Date of death–date of transplant